

M e m o r a n d u m

Date : July 28, 1997

F1-213

To : Lester Snow, Executive Director
CALFED Bay Delta Program
1416 Ninth Street
Sacramento, California 95814

From : Department of Water Resources

Subject : Category III Proposal

Enclosed please find a project proposal in response to the CALFED Bay Delta Program Category III Request for Proposals. This proposal is entitled: *Ecosystem and Natural Process Restoration on the Sacramento River: A Quantitative Characterization of Conditions Required for Riparian Forest Establishment.*

This proposal is one of three proposals related to ecosystem and natural process restoration along the Sacramento River being submitted by the California Department of Water Resources, Northern District. The other proposals, also being submitted today, are entitled: *Upper Sacramento River Fisheries and Riparian Habitat Management Program (SB1086) Implementation: Watershed Management Planning and Sacramento River Geographic Information System: Public Access, Data Development and Exotic Species Mapping.*

Thank you very much for your consideration. If you have any questions, please call me at (916) 529-7342.



Naser J. Bateni, Chief
Northern District

Enclosure

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DWR MAILING

I. Executive Summary

a. Project title

The California Department of Water Resources (DWR) is submitting a proposal for ***Ecosystem and Natural Process Restoration on the Sacramento River: A Quantitative Characterization of Conditions Required for Riparian Forest Establishment.***

b. Project description and primary biological/ecological objectives

This study will determine the hydrologic and geomorphic conditions responsible for the germination and subsequent establishment of woody riparian plants characteristic of young successional forest within a selected reach of the Sacramento River.

The primary ecological objectives of this project are to:

- Address the loss of the riparian zone as a stressor on the Sacramento River riparian ecosystem. This benefits shaded riverine aquatic habitat, riparian habitat, instream aquatic habitat and the species dependent on them. These species include winter-run chinook salmon, spring-run chinook salmon, steelhead trout, green sturgeon, striped bass, and migratory birds.
- Provide information on utilizing natural hydrologic processes to restore riparian forest ecosystem. This ultimately provides the most cost-effective means of meeting the primary goal of the SB1086 riparian habitat management program to establish a continuous riparian ecosystem along the Sacramento River.
- Provide information on the conditions necessary for the germination and establishment of riparian forests associated with the Sacramento River.
- Provide information on the quantity, duration and timing of flows required to maintain a healthy riparian ecosystem.

c. Approach/tasks/schedule

This study will focus on temporal hydrologic conditions (including flow rate, flow duration, seasonal timing, and rates of change) as they relate to specific topographic and substrate conditions that are responsible for the establishment of willow and cottonwood forest. This quantification of field conditions is designed to complement a floodplain ecosystem model being developed by UC Davis research scientists to predict potential areas of riparian forest establishment at a scale of approximately 40 river miles (Map1).

d. Justification for Project

Research into the fundamental mechanics of riparian tree species establishment is needed to determine the quantity, timing, and frequency of flows necessary for the re-establishment of a continuous riparian ecosystem along the Sacramento River as per SB1086.

A critical component to meander zone based management is the adequate establishment and transformation of riparian forests. Each year there is a need to ensure that there is an adequate amount of habitat establishing, maturing and transforming. A firm understanding of the ecological conditions required for primary establishment of riparian forest allows managers to optimize the establishment of vegetation.

e. Budget costs and third party impacts

DWR requests \$243,600 for this research project. This project has taken into account any third party impacts by assuring that research only occurs on the property of willing property owners.

f. Applicant qualifications

Northern District staff of DWR has provided technical assistance to the Upper Sacramento River Fisheries and Habitat Management Planning Process (SB1086). Geologists and environmental specialists are experienced in field data collection and analysis of environmental variables associated with the Sacramento River. In addition, the staff has developed the Sacramento River Geographic Information System, a spatial database currently consisting of 32 data layers, to provide information for river management.

g. Monitoring and data evaluation

This is primarily a monitoring and data evaluation effort which will guide riparian vegetation restoration efforts along the Sacramento River.

h. Local support/coordination with other programs/compatibility with CALFED objectives

Studies on succession, geomorphology, and hydrology are identified in the draft Sacramento River Conservation Handbook developed by the SB1086 Advisory Council as being critical to the understanding of riparian forest succession and restoration along the Sacramento River. These studies will benefit restoration activities conducted by several agencies and organizations along the Sacramento River, including The Nature Conservancy and the U.S. Fish and Wildlife Service (Figure 1, Letter of Support).

The temporal and descriptive nature of this study will complement the spatial and predictive model being developed by UC Davis to assist in regional conservation and ecosystem management planning. The Davis model predicts areas in which riparian forest establishment is possible. This study completes the picture by analyzing flow regimes that can optimize plant establishment.

This proposal meets CALFED's non-ecosystem objectives for ecosystem health, ecosystem integrity, and water quality.

II. Title Page

a. Title of Project

Ecosystem and Natural Process Restoration on the Sacramento River: A Quantitative Characterization of Conditions Required for Riparian Forest Establishment

b. Name of applicant/principal investigator(s); address; phone/fax/e-mail; organizational, institutional or corporate affiliations of applicant/principal investigator(s)

Stacy Cepello, Environmental Specialist IV
California Department of Water Resources

Northern District

2440 Main Street

Red Bluff, CA 96080

Phone: (916) 529-7352

Fax: (916) 529-7322

E-mail: cepello@water.ca.gov

c. Type of organization and tax status

The Department of Water Resources is a state agency.

d. Tax identification number and/or contractor license, as applicable

DWR's tax identification number is 52-1692634

e. Technical and financial contact person(s), address, phone/fax/e-mail

Barbara Polson, Regional Administrative Officer II

California Department of Water Resources

Northern District

2440 Main Street

Red Bluff, CA 96080

Phone: (916) 529-7339

Fax: (916) 529-7322

E-mail: polson@water.ca.gov

f. Participants/collaborators in implementation

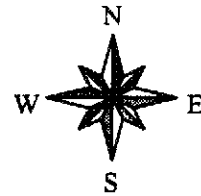
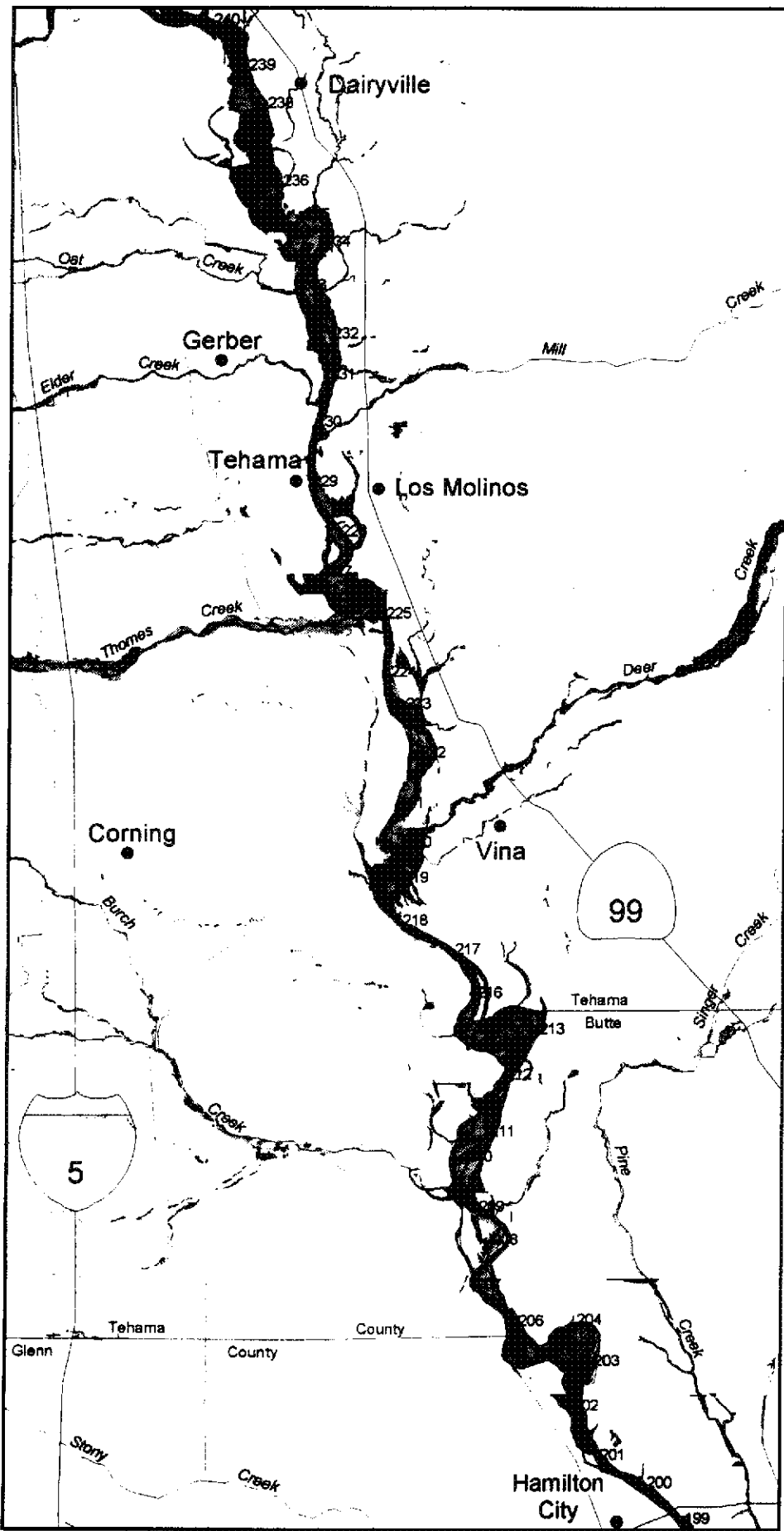
Dr. David M. Wood, a professor in the Department of Biology at California State University at Chico, will oversee graduate students participating in the field studies related to this project.

Dr. Richard E. Plant, a professor of Agronomy and Range Science at the University of California at Davis, will serve in an advisory capacity.

g. RFP project group type:

Group 3: Services

Project Location: Quantitative Characteristics of Conditions Required for Riparian Forest Establishment



III. Project Description

a. Project description and approach

This study will determine the hydrologic and geomorphic conditions responsible for the germination and subsequent establishment of woody riparian plants characteristic of young successional forest within a selected reach of the Sacramento River.

The study focuses on the temporal hydrologic conditions (including flow rate, flow duration, seasonal timing, and rates of change) as they related to specific topographic and substrate conditions that are responsible for the establishment of willow and cottonwood forest. This quantified list is to be designed to complement a floodplain ecosystem model being developed by research scientists at UC Davis under funding from the Central Valley Project Improvement Act (CVPIA) to predict potential areas of riparian forest establishment at a scale of approximately 40 river miles.

b. Proposed scope of work

This is a field oriented project that includes spring and summer field surveys to collect information for vegetation analysis, geomorphic analysis, and hydrologic analysis.

- **Vegetation Analysis:** Well-established willow (*Salix* sp.) and Fremont cottonwood (*Populus fremontii*) stands will be selected, between River Mile 200 and 240, as study sites. The stands will be aged and the initial germination substrata layer determined and characterized. Information on timing and conditions responsible for seed dispersal and germination for each of the species will also be collected.
- **Geomorphic Analysis:** Channel cross sections will be done to correlate USGS gauge height data to calculate flow conditions at each study site. Soil texture and moisture holding capacity will be evaluated within the stand areas.
- **Hydrologic Analysis:** The establishment of riparian vegetation at meander bends and on accreting banks is highly sensitive to changes in surface water flow and soil moisture conditions. Gauge data from USGS stations will be correlated to the geomorphic conditions described above to create a specific model for each study site. Hydrologic parameters including flow rate, stage, flow duration, seasonal timing, and rates of stage height change will be assessed for each study site and compared to determine common conditions required for stand establishment. Once the factors have been quantified, a comparison of how often these conditions have been met pre- and post- Shasta Dam will be made.

c. Location and/or geographic boundaries of project

The project location is along the Sacramento River between river mile 200 near

Hamilton City and river mile 240 near Red Bluff (see attached map). The project area includes portions of Glenn, Butte and Tehama Counties.

d. Expected benefits

This work will support the implementation efforts of the SB1086 riparian habitat restoration planning efforts to reestablish a continuous riparian ecosystem along the Sacramento River. This work facilitates the use of efficient and cost-effective restoration strategies by organizations and agencies conducting such activities along the Sacramento River.

- Addresses how a lack of flows over the floodplain can adversely affect riparian vegetation, by providing information on the water flow conditions (quantity, duration and timing) necessary for the germination, establishment, and maintenance of riparian forests associated with the Sacramento River.
- Addresses the loss of riparian habitat along California's most important river system. This will benefit shaded riverine aquatic habitat, riparian habitat, instream aquatic habitat and the species dependent on them, such as, winter-run chinook salmon, spring-run chinook salmon, steelhead trout, green sturgeon, striped bass, and migratory birds.
- Addresses the long-term health of the ecosystem by determining the conditions that the system requires to take care of itself in perpetuity.

e. Background and biological/technical justification

This quantitative characterization is needed to determine the conditions required for the establishment of riparian species on the Sacramento River. Research scientists have not studied the flows necessary to maintain a healthy riparian system and how frequently and when those flows must occur. This research examines these issues and will also begin to assess the system's viability under the present flow regime. Such studies utilize several approaches in addressing these problems:

- Compile and correlate aerial photographs and hydrograph records: This method has many assumptions and is difficult to interpret. It may not prove to be as robust as field quantification of physical conditions and documentation of forest regeneration and woody species establishment.
- Quantify all regeneration within the study reach: This method assesses all regeneration along the river, rather than using a stratification and sub-sample technique. This would be a more expensive approach.
- Quantitative characterization: This option implements sound ecological field

sampling methods to efficiently and cost-effectively determine the conditions required for woody riparian species to establish successfully.

The basis for the expected benefits is that riparian plants need water for their survival. The viability of the riparian system is primarily dependent upon the characteristics of hydrology, therefore, making it critical to understand what flows are necessary for the maintenance of the system. Both CALFED's *"Vision for the Sacramento River Ecological Zone"* and SB1086's draft Sacramento River Conservation Area Handbook emphasize the use of erosion, deposition, and channel meander to restore riparian and riverine ecosystems. Field information documenting the conditions necessary for establishment and continual renewal of the riparian forest ecosystem will be an indicator of the potential for these processes to allow for natural restoration. Without this information it would be difficult to predict what flows are needed and at what frequency for the continued renewal and health of the riparian forest ecosystem. In addition, determining the flow to maintain ecosystem health leads to the goal of maintaining a viable riparian habitat using the least wasteful and most cost-effective solution. The benefits of this research come from actually implementing the knowledge gained in the wise and efficient management of California's critical resources.

This is a new project on the Sacramento River, similar to assessments of flow requirements for the maintenance of riparian forest currently being conducted on the Missouri and Colorado Rivers. A need still exists to identify flows for the establishment and maintenance of riparian vegetation. This need has been identified in the draft Anadromous Fisheries Restoration Plan and the Sacramento River Conservation Area Handbook (SB1086) which are both in final draft form.

After the first year, DWR will submit a written progress report (Spring 1999). This will include a financial report.

After two years of field surveys (Spring 2000), biological data will be documented, analyzed, and correlated to physical gradients of hydrology and soil moisture. The report will identify specific physiological requirements of germination and establishment of cottonwood and willow forest and the relationship of those requirements to existing flow conditions along the Sacramento River within the study area. A final financial report will be included.

f. Monitoring and data evaluation

Field collection will be conducted under rigorous scientific protocol. Data will be collected in conjunction with concurrent graduate level studies at both CSUC and UC Davis.

g. Implementability

Physical collection of data requires the use of boats to access study areas. Written permission will be acquired from private and public landowners as required for access to study areas. Field data collection will only occur on property of willing landowners.

This project can be implemented immediately. Hydrologic conditions may delay the spring field season. In the worst case scenario, field work could possibly be delayed one or more years.

This project is consistent with the goals of the SB1086 program which represents local community members and agencies. It is also supported by the academic community, specifically California State University, Chico and the University of California at Davis.

IV. Costs and Schedules to Implement Proposed Project

a. Budget costs

Project Phase and Task	Direct Labor Hours	Direct Salary & Benefits	Overhead Labor (General, admin and fee)	Service Contracts	Material and Acquisition Contracts	Miscellaneous and Direct Costs	Total Cost
Year 1	556	\$23,500	\$18,800	\$50,000	\$15,000	\$20,000	\$127,300
Year 2	740	\$31,300	\$25,000	\$50,000	\$0	\$10,000	\$116,300

b. Schedule milestones

The scheduled milestones are as follows:

Year 1	Progress Report	Financial Report
Year 2	Final Report	Financial Report

c. Third party impacts

Third party impacts will be eliminated by obtaining written permission from private and public landowners as required for property access.

V. Applicant Qualifications

Project Management and coordination will be the responsibility of DWR Northern District Office. The Northern District Office has extensive experience in fisheries and riparian vegetation restoration projects throughout Northern California including the Sacramento River. The Northern District office has staff is qualified in the areas of botany, hydrology, hydrogeology. The Northern District also has conducted extensive botanical and fluvial-geomorphic field studies along the Sacramento River.

Project Manager Stacy Cepello, Environmental Specialist IV, is the lead person for the environmental services section of the Northern District Office. Mr. Cepello has over 12 years of experience on fisheries and riparian restoration projects in the Sacramento Valley. The project manager will draw on the staff expertise and resources available in the Northern District Office to support the field surveys and analysis of data related to this proposal.

Graduate Student oversight will be provided by Dr. David M. Wood, Department of Biology, California State University, Chico. Dr. Wood is a plant ecologist who conducts research on primary succession, restoration ecology, and plant populations. He is also knowledgeable in the fields of statistical ecology and simulation modelling.

Faculty Advisor is Dr. Richard E. Plant, Department of Agronomy and Range Science, University of California, Davis. Dr. Plant conducts research in systems analysis, particularly in relation to agricultural and resource management. He has done modeling of plant environment interactions as well as the spatial and temporal aspects of vegetation succession.

Contract Administrator Barbara Polson, is the Regional Administrative Officer II of the Administrative Branch of DWR's Northern District Office.

VI. Compliance with Standard Terms and Conditions

The applicant is in agreement with, and will comply with, all standard terms and conditions, including the Interagency Agreements and standard clauses, included in the Request for Proposals.



California Regional Office
201 Mission Street, 4th Floor
San Francisco, California 94105

International Headquarters
Arlington, Virginia
TEL 703 841-5300

TEL 415 777-0487
FAX 415 777-0244 & 415 777-0772

July 25, 1997

Lester Snow, Executive Director
CALFED Bay-Delta Program
1416 Ninth Street, Suite 1155
Sacramento, California 95814

Dear Mr. Snow:

The Nature Conservancy would like to express strong support for the Category III proposal being submitted by the Department of Water Resources entitled **"Ecosystem and Natural Process Restoration on the Sacramento River: An Analysis of Conditions Required for Riparian Forest Establishment"**. The proposed project will provide a quantitative analysis of hydrologic and other conditions necessary for riparian forest establishment; this analysis will inform acquisition and restoration efforts along the River.

This proposal is one of a host being submitted by a variety of partners for Category III funding during this funding cycle. These elements support a vision for ecosystem protection and restoration which is clearly larger than the sum of their parts. These complementary proposals are:

- Ecosystem and Natural Process Restoration on the Sacramento River: Floodplain Acquisition Project (for acquisition and management of an estimated 1,500 acres), submitted by the Wildlife Conservation Board, Fish and Wildlife Service, and The Nature Conservancy;
- Ecosystem and Natural Process Restoration on the Sacramento River: Active Restoration of Riparian Forest (for direct planting of 300 floodprone acres), submitted by the above partners;
- Sacramento River Environmental GIS and Mapping Support, submitted by California State University at Chico;
- Ecosystem and Natural Process Restoration on the Sacramento River: The Use of Bird Populations to Monitor, Conserve, and Restore Riverine Habitats, submitted by Point Reyes Bird Observatory; and
- Ecosystem and Natural Process Restoration on the Sacramento River: A Meanderbelt Implementation Project, submitted by The Nature Conservancy.
- Upper Sacramento River Fisheries and Riparian Habitat Management Program (SB 1086) Implementation: Watershed Management Planning and Coordination," submitted by DWR.

We appreciate your consideration of this proposal in light of the overall ecosystem effort, and look forward to working together to create a healthy Sacramento River ecosystem.

Regards,

A handwritten signature in cursive script that reads "Steve McCormick".
Steve McCormick
Regional Director